

AMENDMENTS TO THE CLAIMS

Please amend the claims as follows. This listing of the claims will replace any previous listing of claims as the pending claims.

1-5. (Canceled)

6. (Previously presented) An isolated nucleic acid comprising the nucleotide sequence of SEQ ID NO:1.

7-42. (Canceled)

43. (Previously presented) An isolated nucleic acid comprising a nucleotide sequence coding for the amino acid sequence of SEQ ID NO:2.

44-45. (Canceled)

46. (New) An isolated nucleic acid comprising a nucleotide sequence coding for the amino acid sequence of SEQ ID NO:4.

47. (New) The isolated nucleic acid of claim 46 wherein the nucleotide sequence is that of SEQ ID NO:3.

48. (New) An isolated nucleic acid comprising a nucleotide sequence coding for the amino acid sequence of SEQ ID NO:6.

49. (New) The isolated nucleic acid according to claim 48, wherein the nucleotide sequence is the sequence of SEQ ID NO:5.

50. (New) An isolated nucleic acid comprising a nucleotide sequence coding for the amino acid sequence of SEQ ID NO: 8.

51. (New) The isolated nucleic acid according to claim 50, wherein the nucleotide sequence is the sequence of SEQ ID NO: 7.

52. (New) A nucleic acid comprising a nucleotide sequence coding for an amino acid sequence of a protein which produces raffinose by combining a D-galactosyl group through an $\alpha(1 \rightarrow 6)$ bond with a hydroxyl group attached to the carbon atom at position 6 of a D-glucose residue in a sucrose molecule, wherein said nucleotide sequence comprises a nucleotide sequence selected from the group consisting of:

- (a) a nucleotide sequence of SEQ ID NO:1,
- (b) a nucleotide sequence encoding the amino acid sequence of SEQ ID NO:2,
- (c) a nucleotide sequence of SEQ ID NO:3,

- (d) a nucleotide sequence encoding the amino acid sequence of SEQ ID NO:4,
- (e) a nucleotide sequence of SEQ ID NO:5,
- (f) a nucleotide sequence encoding the amino acid sequence of SEQ ID NO:6,
- (g) a nucleotide sequence of SEQ ID NO:7, and
- (h) a nucleotide sequence encoding the amino acid sequence of SEQ ID NO:8.

53. (New) A nucleic acid isolated from a plant comprising a nucleotide sequence coding for an amino acid sequence of a protein which produces raffinose by combining a D-galactosyl group through an $\alpha(1 \rightarrow 6)$ bond with a hydroxyl group attached to the carbon atom at position 6 of a D-glucose residue in a sucrose molecule, wherein said nucleotide sequence comprises a nucleotide sequence selected from the group consisting of:

- (a) a nucleotide sequence obtained by amplifying a nucleic acid obtained from a leguminous plant with a combination of a PCR primer selected from the group consisting of SEQ ID NO:9, SEQ ID NO:15, SEQ ID NO:55, SEQ ID NO:56, SEQ ID NO:57, and SEQ ID NO:58 and a PCR primer selected from the group consisting of SEQ ID NO:10, SEQ ID NO:11, SEQ ID NO:17, and SEQ ID NO:53, wherein said nucleotide sequence hybridizes with a nucleotide sequence

complementary to the nucleotide sequence of SEQ ID NO:1 in 0.9 M NaCl, 0.09 M citric acid at 65°C,

(b) a nucleotide sequence obtained by amplifying a nucleic acid obtained from a leguminous plant with a combination of a PCR primer selected from the group consisting of SEQ ID NO:12, SEQ ID NO:19, SEQ ID NO:65, and SEQ ID NO:68 and a PCR primer selected from the group consisting of SEQ ID NO:13, SEQ ID NO:14, SEQ ID NO:21, and SEQ ID NO:70, wherein said nucleotide sequence with a nucleotide sequence complementary to the nucleotide sequence of SEQ ID NO:3 in 0.9 M NaCl, 0.09 M citric acid at 65°C,

(c) a nucleotide sequence obtained by amplifying a nucleic acid obtained from a lamiaceous plant with a combination of a PCR primer selected from the group consisting of SEQ ID NO:71 and SEQ ID NO:73 and a PCR primer selected from the group consisting of SEQ ID NO:72 and SEQ ID NO:74, wherein said nucleotide sequence hybridizes with a nucleotide sequence complementary to the nucleotide sequence of SEQ ID NO:5 in 0.9 M NaCl, 0.09 M citric acid at 65°C, and

(d) a nucleotide sequence obtained by amplifying via the RACE process a nucleic acid obtained from a monocotyledonous plant with a PCR primer selected from the group consisting of SEQ ID NO:77 and SEQ ID NO:78, wherein said nucleotide sequence hybridizes with a nucleotide sequence complementary to the nucleotide sequence of SEQ ID NO:7 in 0.9 M NaCl, 0.09 M citric acid at 65°C.

54. (New) The isolated nucleic acid (a) according to claim 53, wherein the leguminous plant is broad bean.

55. (New) The isolated nucleic acid (b) according to claim 53, wherein the leguminous plant is soybean.

56. (New) The isolated nucleic acid (c) according to claim 53, wherein the lamiaceous plant is Japanese artichoke.

57. (New) The isolated nucleic acid (d) according to claim 53, wherein the monocotyledonous plant is a gramineous plant.

58. (New) The isolated nucleic acid according to claim 57, wherein the gramineous plant is corn.

59. (New) A chimeric gene comprising a nucleic acid comprising a nucleotide sequence coding for an amino acid sequence of a protein which produces raffinose by combining a D-galactosyl group through an $\alpha(1 \rightarrow 6)$ bond with a hydroxyl group attached to the carbon atom at position 6 of a D-glucose residue in a sucrose molecule, wherein said nucleotide sequence comprises a nucleotide sequence selected from the group consisting of:

(a) a nucleotide sequence of SEQ ID NO:1,

(b) a nucleotide sequence encoding the amino acid sequence of SEQ ID NO:2,

(c) a nucleotide sequence of SEQ ID NO:3,

(d) a nucleotide sequence encoding the amino acid sequence of SEQ ID NO:4,

(e) a nucleotide sequence of SEQ ID NO:5,

(f) a nucleotide sequence encoding the amino acid sequence of SEQ ID NO:6,

(g) a nucleotide sequence of SEQ ID NO:7, and

(h) a nucleotide sequence encoding the amino acid sequence of SEQ ID NO:8;

and a promoter operatively linked thereto.

60. (New) The chimeric gene of claim 59, in which the promoter is selected from the group consisting of a promoter functional in *E. coli*, a yeast alcohol dehydrogenase promoter, an adenovirus major late promoter, an SV40 early promoter, a baculovirus promoter, a nopaline synthase promoter, an octopine synthase promoter, a cauliflower mosaic virus 19S promoter, a cauliflower mosaic virus 35S promoter, a phenylalanine-amino lyase promoter, a chalcone synthase promoter, a glycinin promoter and a pathogenesis-related protein promoter.

61. (New) A chimeric gene comprising a nucleic acid isolated from a plant comprising a nucleotide sequence coding for an amino acid sequence of a protein which produces raffinose by combining a D-galactosyl group through an $\alpha(1\rightarrow6)$ bond with a hydroxyl group attached to the carbon atom at position 6 of a D-glucose residue in a sucrose molecule, wherein said nucleotide sequence comprises a nucleotide sequence selected from the group consisting of:

(a) a nucleotide sequence obtained by amplifying a nucleic acid obtained from a leguminous plant with a combination of a PCR primer selected from the group consisting of SEQ ID NO:9, SEQ ID NO:15, SEQ ID NO:55, SEQ ID NO:56, SEQ ID NO:57, and SEQ ID NO:58 and a PCR primer selected from the group consisting of SEQ ID NO:10, SEQ ID NO:11, SEQ ID NO:17, and SEQ ID NO:53, wherein said nucleotide sequence hybridizes with a nucleotide sequence complementary to the nucleotide sequence of SEQ ID NO:1 in 0.9 M NaCl, 0.09 M citric acid at 65°C,

(b) a nucleotide sequence obtained by amplifying a nucleic acid obtained from a leguminous plant with a combination of a PCR primer selected from the group consisting of SEQ ID NO:12, SEQ ID NO:19, SEQ ID NO:65, and SEQ ID NO:68 and a PCR primer selected from the group consisting of SEQ ID NO:13, SEQ ID NO:14, SEQ ID NO:21, and SEQ ID NO:70, wherein said nucleotide sequence with a nucleotide sequence complementary to the nucleotide sequence of SEQ ID NO:3 in 0.9 M NaCl, 0.09 M citric acid at 65°C,

(c) a nucleotide sequence obtained by amplifying a nucleic acid obtained from a lamiaceous plant with a combination of a PCR primer selected from the group consisting of SEQ ID NO:71 and SEQ ID NO:73 and a PCR primer selected from the group consisting of SEQ ID NO:72 and SEQ ID NO:74, wherein said nucleotide sequence hybridizes with a nucleotide sequence complementary to the nucleotide sequence of SEQ ID NO:5 in 0.9 M NaCl, 0.09 M citric acid at 65°C, and

(d) a nucleotide sequence obtained by amplifying via the RACE process a nucleic acid obtained from a monocotyledonous plant with a PCR primer selected from the group consisting of SEQ ID NO:77 and SEQ ID NO:78, wherein said nucleotide sequence hybridizes with a nucleotide sequence complementary to the nucleotide sequence of SEQ ID NO:7 in 0.9 M NaCl, 0.09 M citric acid at 65°C; and a promoter operatively linked thereto.

62. (New) The chimeric gene of claim 61, in which the promoter is selected from the group consisting of a promoter functional in *E. coli*, a yeast alcohol dehydrogenase promoter, an adenovirus major late promoter, an SV40 early promoter, a baculovirus promoter, a nopaline synthase promoter, an octopine synthase promoter, a cauliflower mosaic virus 19S promoter, a cauliflower mosaic virus 35S promoter, a phenylalanine-amino

lyase promoter, a chalcone synthase promoter, a glycinin promoter and a pathogenesis-related protein promoter.

63. (New) A transformant obtained by introducing the chimeric gene of claim 59 into a host organism.

64. (New) A transformant obtained by introducing the chimeric gene of claim 61 into a host organism.

65. (New) A plasmid comprising a nucleic acid comprising a nucleotide sequence coding for an amino acid sequence of a protein which produces raffinose by combining a D-galactosyl group through an $\alpha(1\rightarrow6)$ bond with a hydroxyl group attached to the carbon atom at position 6 of a D-glucose residue in a sucrose molecule, wherein said nucleotide sequence comprises a nucleotide sequence selected from the group consisting of:

- (a) a nucleotide sequence of SEQ ID NO:1,
- (b) a nucleotide sequence encoding the amino acid sequence of SEQ ID NO:2,
- (c) a nucleotide sequence of SEQ ID NO:3,
- (d) a nucleotide sequence encoding the amino acid sequence of SEQ ID NO:4,
- (e) a nucleotide sequence of SEQ ID NO:5,

(f) a nucleotide sequence encoding the amino acid sequence of SEQ ID NO:6,

(g) a nucleotide sequence of SEQ ID NO:7, and

(h) a nucleotide sequence encoding the amino acid sequence of SEQ ID NO:8.

66. (New) A plasmid comprising a nucleic acid isolated from a plant comprising a nucleotide sequence coding for an amino acid sequence of a protein which produces raffinose by combining a D-galactosyl group through an $\alpha(1\rightarrow6)$ bond with a hydroxyl group attached to the carbon atom at position 6 of a D-glucose residue in a sucrose molecule, wherein said nucleotide sequence comprises a nucleotide sequence selected from the group consisting of:

(a) a nucleotide sequence obtained by amplifying a nucleic acid obtained from a leguminous plant with a combination of a PCR primer selected from the group consisting of SEQ ID NO:9, SEQ ID NO:15, SEQ ID NO:55, SEQ ID NO:56, SEQ ID NO:57, and SEQ ID NO:58 and a PCR primer selected from the group consisting of SEQ ID NO:10, SEQ ID NO:11, SEQ ID NO:17, and SEQ ID NO:53, wherein said nucleotide sequence hybridizes with a nucleotide sequence complementary to the nucleotide sequence of SEQ ID NO:1 in 0.9 M NaCl, 0.09 M citric acid at 65°C,

(b) a nucleotide sequence obtained by amplifying a nucleic acid obtained from a leguminous plant with a combination of a PCR

primer selected from the group consisting of SEQ ID NO:12, SEQ ID NO:19, SEQ ID NO:65, and SEQ ID NO:68 and a PCR primer selected from the group consisting of SEQ ID NO:13, SEQ ID NO:14, SEQ ID NO:21, and SEQ ID NO:70, wherein said nucleotide sequence hybridizes with a nucleotide sequence complementary to the nucleotide sequence of SEQ ID NO:3 in 0.9 M NaCl, 0.09 M citric acid at 65°C,

(c) a nucleotide sequence obtained by amplifying a nucleic acid obtained from a lamiaceous plant with a combination of a PCR primer selected from the group consisting of SEQ ID NO:71 and SEQ ID NO:73 and a PCR primer selected from the group consisting of SEQ ID NO:72 and SEQ ID NO:74, wherein said nucleotide sequence hybridizes with a nucleotide sequence complementary to the nucleotide sequence of SEQ ID NO:5 in 0.9 M NaCl, 0.09 M citric acid at 65°C, and

(d) a nucleotide sequence obtained by amplifying via the RACE process a nucleic acid obtained from a monocotyledonous plant with a PCR primer selected from the group consisting of SEQ ID NO:77 and SEQ ID NO:78, wherein said nucleotide sequence hybridizes with a nucleotide sequence complementary to the nucleotide sequence of SEQ ID NO:7 in 0.9 M NaCl, 0.09 M citric acid at 65°C.

67. (New) A host organism transformed with the plasmid of claim 65, or a cell thereof.

68. (New) The host organism of claim 67 that is a microorganism.

69. (New) A plant transformed with the plasmid of claim 65, or a cell thereof.

70. (New) A host organism transformed with the plasmid of claim 66, or a cell thereof.

71. (New) The host organism of claim 70 that is a microorganism.

72. (New) A plant transformed with the plasmid of claim 66, or a cell thereof.

73. (New) A method for metabolic modification, which comprises introducing a nucleic acid comprising a nucleotide sequence coding for an amino acid sequence of a protein which produces raffinose by combining a D-galactosyl group through an $\alpha(1 \rightarrow 6)$ bond with a hydroxyl group attached to the carbon atom at position 6 of a D-glucose residue in a sucrose molecule, wherein said nucleotide sequence comprises a nucleotide sequence selected from the group consisting of:

(a) a nucleotide sequence of SEQ ID NO:1,

- (b) a nucleotide sequence encoding the amino acid sequence of SEQ ID NO:2,
- (c) a nucleotide sequence of SEQ ID NO:3,
- (d) a nucleotide sequence encoding the amino acid sequence of SEQ ID NO:4,
- (e) a nucleotide sequence of SEQ ID NO:5,
- (f) a nucleotide sequence encoding the amino acid sequence of SEQ ID NO:6,
- (g) a nucleotide sequence of SEQ ID NO:7, and
- (h) a nucleotide sequence encoding the amino acid sequence of SEQ ID NO:8.

74. (New) A method for metabolic modification, which comprises introducing a nucleic acid isolated from a plant comprising a nucleotide sequence coding for an amino acid sequence of a protein which produces raffinose by combining a D-galactosyl group through an $\alpha(1 \rightarrow 6)$ bond with a hydroxyl group attached to the carbon atom at position 6 of a D-glucose residue in a sucrose molecule, wherein said nucleotide sequence comprises a nucleotide sequence selected from the group consisting of:

- (a) a nucleotide sequence by amplifying a nucleic acid obtained from a leguminous plant with a combination of a PCR primer selected from the group consisting of SEQ ID NO:9, SEQ ID NO:15, SEQ ID NO:55, SEQ ID NO:56, SEQ ID NO:57, and SEQ ID NO:58

and a PCR primer selected from the group consisting of SEQ ID NO:10, SEQ ID NO:11, SEQ ID NO:17, and SEQ ID NO:53, wherein said nucleotide sequence hybridizes with a nucleotide sequence complementary to the nucleotide sequence of SEQ ID NO:1 in 0.9 M NaCl, 0.09 M citric acid at 65°C,

(b) a nucleotide sequence obtained by amplifying a nucleic acid obtained from a leguminous plant with a combination of a PCR primer selected from the group consisting of SEQ ID NO:12, SEQ ID NO:19, SEQ ID NO:65, and SEQ ID NO:68 and a PCR primer selected from the group consisting of SEQ ID NO:13, SEQ ID NO:14, SEQ ID NO:21, and SEQ ID NO:70, wherein said nucleotide sequence hybridizes with a nucleotide sequence complementary to the nucleotide sequence of SEQ ID NO:3 in 0.9 M NaCl, 0.09 M citric acid at 65°C,

(c) a nucleotide sequence obtained by amplifying a nucleic acid obtained from a lamiaceous plant with a combination of a PCR primer selected from the group consisting of SEQ ID NO:71 and SEQ ID NO:73 and a PCR primer selected from the group consisting of SEQ ID NO:72 and SEQ ID NO:74, wherein said nucleotide sequence hybridizes with a nucleotide sequence complementary to the nucleotide sequence of SEQ ID NO:5 in 0.9 M NaCl, 0.09 M citric acid at 65°C, and

(d) a nucleotide sequence obtained by amplifying via the RACE process from a nucleic acid obtained from a monocotyledon with a

PCR primer selected from the group consisting of SEQ ID NO:77 and SEQ ID NO:78, wherein said nucleotide sequence hybridizes with a nucleotide sequence complementary to the nucleotide sequence of SEQ ID NO:7 in 0.9 M NaCl, 0.09 M citric acid at 65°C,

into a host organism or a cell thereof, so that the content of raffinose family oligosaccharides in the host organism or the cell thereof is changed.

75. (New) An isolated nucleic acid comprising (i) a polynucleotide having a sequence that encodes a protein having an amino acid sequence selected from the group consisting of SEQ ID NOs: 2, 4, 6, or 8 or (ii) a polynucleotide having a sequence complementary to said sequence.

76. (New) An isolated nucleic acid comprising (i) a polynucleotide having a nucleotide sequence selected from the group consisting of SEQ ID NOs: 1, 3, 5, or 7 or (ii) a polynucleotide having a sequence complementary to said sequence.

77. (New) A nucleic acid isolated from a plant comprising a nucleotide sequence coding for an amino acid sequence of a protein which produces raffinose by combining a D-galactosyl group through an $\alpha(1 \rightarrow 6)$ bond with a hydroxyl group attached to the carbon atom at position 6 of a D-glucose residue in a sucrose molecule,

wherein said nucleotide sequence comprises a nucleotide sequence selected from the group consisting of:

(a) a nucleotide sequence obtained by amplifying a nucleic acid obtained from broad bean with a combination of a PCR primer selected from the group consisting of SEQ ID NO:9, SEQ ID NO:15, SEQ ID NO:55, SEQ ID NO:56, SEQ ID NO:57, and SEQ ID NO:58 and a PCR primer selected from the group consisting of SEQ ID NO:10, SEQ ID NO:11, SEQ ID NO:17, and SEQ ID NO:53, wherein said nucleotide sequence hybridizes with a nucleotide sequence complementary to the nucleotide sequence of SEQ ID NO:1 in 0.9 M NaCl, 0.09 M citric acid at 65°C,

(b) a nucleotide sequence obtained by amplifying a nucleic acid obtained from soybean with a combination of a PCR primer selected from the group consisting of SEQ ID NO:12, SEQ ID NO:19, SEQ ID NO:65, and SEQ ID NO:68 and a PCR primer selected from the group consisting of SEQ ID NO:13, SEQ ID NO:14, SEQ ID NO:21, and SEQ ID NO:70, wherein said nucleotide sequence hybridizes with a nucleotide sequence complementary to the nucleotide sequence of SEQ ID NO:3 in 0.9 M NaCl, 0.09 M citric acid at 65°C,

(c) a nucleotide sequence obtained by amplifying a nucleic acid obtained from Japanese artichoke with a combination of a PCR primer selected from the group consisting of SEQ ID NO:71 and SEQ ID NO:73 and a PCR primer selected from the group consisting of SEQ ID NO:72 and SEQ ID NO:74, wherein said nucleotide sequence

hybridizes with a nucleotide sequence complementary to the nucleotide sequence of SEQ ID NO:5, in 0.9 M NaCl, 0.09 M citric acid at 65°C, and

(d) a nucleotide sequence obtained by amplifying via the RACE process from a nucleic acid obtained from corn with a PCR primer selected from the group consisting of SEQ ID NO:77 and SEQ ID NO:78, wherein said nucleotide sequence hybridizes with a nucleotide sequence complementary to the nucleotide sequence of SEQ ID NO:7 in 0.9 M NaCl, 0.09 M citric acid at 65°C.